Developers Guidelines

October 2004

Bluetooth™ HID remote control

K700 series
S700 series
V800 series

Sony Ericsson

Preface

Purpose of this document

This document describes how to create and maintain Bluetooth™ Human Interface Device (HID) configuration files for Sony Ericsson mobile phones.

The document is intended for content providers who want guidelines for the optimal creation of HID configuration files and the elements required for an appealing remote control application.

People who can benefit from this document are:

- Software developers
- Operators and service providers
- Content providers
- IT managers

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Online developer resources

On http:/www.SonyEricsson.com/developer, developers will find all documentation and tools such as phone White Papers, Developers Guidelines, SDKs, APIs and so on. The developer Web site also contains discussion forums monitored by our Sony Ericsson Developer Support team, a searcheable Knowledge Base of support queries and solutions, Tips & Tricks, example code and so on. To stay up-to-date on development issues, register and subscribe to the monthly Sony Ericsson Developer Newsletter.

Sony Ericsson Developer Support

Sony Ericsson offers developers professional technical support services. The service can be purchased from the developer web portal, as part of the Sony Ericsson Core and Core+ membership package or as individual support incidents. There are two levels of support, described below.

The **Basic E-mail Developer Support** is an annual support service included in the Core membership that provides developers with all the basics to successfully develop world-class applications for Sony Ericsson products. With this support contract, developers get access to Sony Ericsson developer support engineers via email with same-day response, five technical support incidents as well as the ability to purchase more.

The **Priority E-mail Developer Support** is an annual support service included in the Core+ membership that equips professional developers with everything they need to successfully develop world-class applications for Sony Ericsson products. With this support contract, developers get priority access to Sony Ericsson developer support engineers via email with fast response times and up to 50 technical support incidents.

Document conventions

Products

Sony Ericsson mobile phones are referred to in this document using generic names as follows:

Generic names Series	**Sony Ericsson mobile phones**
K700	K700i, K700c
S700	S700i, S700c, S710a
V800	V800, Vodafone 802SE

Terminology

FTP	File Transfer Profile
HID	Human Interface Device
HTML	Hypertext Markup Language
MMS	Multimedia Messaging Service
OBEX	Object Exchange protocol
OPP	Object Push Profile
TAR	Tape Archiver
USB	Universal Serial Bus
WAP	Wireless Application Protocol
XML	Extensible Markup Language

Typographical conventions

The following typographical conventions are used in this document.

XML element names are written inside “<“ and “>”:
<ACTION>

XML attributes are written inside double quotes:
“MODIFIERS”

Code is written in Courier font:

```
<ACTION>
....
</ACTION>
```

Trademarks and acknowledgements

Document history

Change history		
2004-05-10	R1A	First edition
2004-05-27	R1B	Revised first edition
2004-10-08	R2A	Second edition. V800 series added
2004-10-26	R2B	Minor editorial changes

Contents

Overview

The Sony Ericsson mobile phones referred to in this document all include the functionality for remote control of computer applications using Bluetooth HID (Human Interface Device) profile.

Bluetooth™ HID remote control

The Bluetooth™ HID (Human Interface Device) profile is built on the USB (Universal Serial Bus) HID standard. Bluetooth mouse devices, keyboards and other devices for computer remote control can be developed using this standard.

Through the *Bluetooth Specification, Human Interface Device (HID) Profile v1.0* https://www.bluetooth.org), a mobile phone can act as a HID device. When connected to a computer, the mobile phone acts like a combined keyboard and mouse. By assigning a combination of computer keyboard key presses to keys on the mobile phone keypad, the mobile phone can be used as a remote control device for computer applications.

The mobile phone keypad is configured for control of a computer application through a HID configuration file. This is a TAR file containing two other files: one XML file for the keypad key assignments and one image file containing the image to be shown on the phone screen. The image can, for example, display what functions are assigned to each key on the mobile phone keypad.

HID configuration files can be downloaded to the mobile phone using standard file transfer mechanisms. Users can modify configuration files using a computer. A few configuration files are pre-loaded in the mobile phone, for example, configurations that allow the user to navigate on a computer desktop or control presentations and media players.

User settings

The following keys can be configured through the HID configuration files:
0-9, **#**, *****, **volume up** and **volume down**.
For each of these keys, a UsageID can be assigned (see the *Universal Serial Bus, HID Usage Tables v1.11* http://www.usb.org/developers/devclass_docs/Hut1_11.pdf).

The navigation keys (joystick) and the two selection keys can also be configured. By default, they provide functions for moving the cursor and clicking the right and left mouse buttons.

Communication methods

The HID based remote control function uses Bluetooth communication.

HID configuration files can be transferred to mobile phones via the following communication methods:

- Download via Bluetooth, Infrared, cable or Over The Air with the built in mobile browser client in the mobile phone.
- Transfer from other mobile phones via Bluetooth, Infrared or MMS.
- As email attachments.

Architecture

This chapter contains detailed information about the Bluetooth HID remote control implementation in Sony Ericsson mobile phones that support this feature.

The remote control menu

The ***Remote control*** menu in the phone is found under ***Connectivity/Bluetooth***. Here the user can see what HID configurations files are installed on the mobile phone. The user can choose to delete a HID configuration file or send it to another device.

Installing a mobile phone as a HID device

A Bluetooth connection between a mobile phone and a computer (pairing) can be initiated from either device. In some computer applications, the user has to explicitly enable the HID service for use with the mobile phone. When the phone and computer are paired, the devices are automatically connected via Bluetooth, whenever they are in range.

Initiating a connection from a mobile phone

Selecting a HID configuration file starts the HID application. The screen and keypad are configured according to the settings in the selected file. When the HID application starts, the mobile phone first tries to connect to the last HID device it was connected to. If that connection is not available, the mobile phone prompts the user to select another device to connect to.

Initiating a connection from a computer

When a computer (or other HID device) initiates a HID connection to the mobile phone, the remote control menu in the phone pops up, and the user can select a HID configuration file.

HID configuration files

Structure

The HID configuration file used by the mobile phone is identified by the extension ".hid". It is actually a TAR file containing one image file and one keypad configuration file (XML file). The image is shown on the mobile phone screen when the HID configuration file is in use. The keypad configuration file defines what codes the mobile phone sends when a key is pressed on the keypad of the mobile phone.

Image formats

The image in the HID configuration file can be in any size and format supported by the phone's image viewer, for example JPG, JPEG, GIF or WBMP.

The image can, for example, be used to display what functions are assigned to each key on the keypad of the mobile phone.

There is no HID specific restriction to the size of the image used in a HID configuration. It is recommended to make the file fit in the screen size of the particular mobile phone.

Screen sizes:

- K700 and V800 series: 176x220 pixels.
- S700 series: 240x320 pixels

Keypad configuration file

This section describes the XML elements and attributes supported in v1.0 of the Sony Ericsson HID device implementation.

The keypad configuration file is a text file with the extension ".kcf". The key mappings are defined using XML. The file has the following structure:

```
<SONY_ERICSSON_REMOTE_CONTROL_CONFIGURATION VERSION = "1.0" >
<KEYMAP>
<KEY_LSK>
<ACTION>
<MOUSE BUTTONS = "Left">
</ACTION>
</KEY_LSK>
<KEY_DOWN>
<ACTION>
<MOUSE MOVEMENT = "Down">
</ACTION>
</KEY_DOWN>
...
<KEY_1>
<ACTION>
<KEYBOARD MODIFIERS = "00" USAGEID "29">
</ACTION>
</KEY_1>
<KEY_2>
...
</KEYMAP>
</SONY_ERICSSON_REMOTE_CONTROL_CONFIGURATION>
```

<KEY_>

The following keys on the mobile phone keypad can be configured:

Value	Key
KEY_1	1
KEY_2	2
KEY_3	3
KEY_4	4
KEY_5	5
KEY_6	6
KEY_7	7
KEY_8	8
KEY_9	9
KEY_STAR	*
KEY_0	0
KEY_HASH	#
KEY_VOL_UP	+ (volume up)
KEY_VOL_DOWN	- (volume down)
KEY_CAM	Camera button

KEY_LSK	Left selection key
KEY_RSK	Right selection key
KEY_JOY	Pressing the navigation key
KEY_LEFT	Pressing the navigation key left
KEY_RIGHT	Pressing the navigation key right
KEY_UP	Pressing the navigation key up
KEY_DOWN	Pressing the navigation key down

For each key, the action can be defined using any of the supported usage pages. In the current version, the following usage pages are supported:

- Generic desktop page for mouse functionality
- Keyboard/Keypad page

See *Universal Serial Bus, HID Usage Tables v1.11* (http://www.usb.org/developers/devclass_docs/Hut1_11.pdf).

<ACTION>

Within the <ACTION> element, the action to be taken when the key is pressed is defined. In v1.0, only one action per key press can be performed.

When defining an action based on the keyboard page, the <KEYBOARD> element must be included.

When defining an action based on the Generic Desktop page, the <MOUSE> element must be included.

<KEYBOARD>

When defining the <KEYBOARD> element, **both** of the following attributes must be included:

- MODIFIERS
- USAGEID

MODIFIERS

The “MODIFIERS” attribute value is the decimal representation of a bit mask where each of the 8 bits, defined in the table below, can be set independently:

Bit	Value	Modifier Key
0	01	Left Ctrl
1	02	Left Shift
2	04	Left Alt
3	08	Left GUI
4	16	Right Ctrl
5	32	Right Shift

6	64	Right Alt
7	128	Right GUI

For example, Ctrl+Alt corresponds to the value 05 (01 + 04)

USAGEID

The “USAGEID” attribute values are defined for each usage page in the *Universal Serial Bus, HID Usage Tables v1.11* (http://www.usb.org/developers/devclass_docs/Hut1_11.pdf) document.

Example:

```
<KEY_1>
<ACTION>
<KEYBOARD MODIFIERS = "00" USAGEID "29">
</ACTION>
</KEY_1>
```

<MOUSE>

When defining the <MOUSE> element, **one and only one** of the following attributes must be included:

- BUTTONS
- MOVEMENT

BUTTONS

Mouse button	**Value**
Left mouse button	`Left`
Right mouse button	`Right`

Example:

```
<KEY_LSK>
<ACTION>
<MOUSE BUTTONS = "Left">
</ACTION>
</KEY_LSK>
```

MOVEMENT

Movement	Value
Move mouse cursor to the left	`Left`
Move mouse cursor to the right	`Right`
Move mouse cursor up	`Up`
Move mouse cursor down	`Down`
Move mouse cursor up and left	`UpLeft`
Move mouse cursor up and right	`UpRight`
Move mouse cursor down and left	`DownLeft`
Move mouse cursor down and right	`DownRight`

Example:

```
<KEY_DOWN>
<ACTION>
<MOUSE MOVEMENT = "Down">
</ACTION>
</KEY_DOWN>
```

Configuration file transfer

HID configuration files can be transferred to a mobile phone using several methods just like any other file type. Files can be:

- Received through an OBEX PUT operation from a computer or another mobile phone via Bluetooth according to OPP or FTP, via Infrared or via cable.
- Downloaded Over The Air with the built in browser client or using an OBEX GET operation via Bluetooth according to FTP.
- Received as an email attachment or in an MMS message.

Configuration files can be transferred from the mobile phone to a computer or another mobile phone using an OBEX PUT operation via Bluetooth according to OPP or FTP, via Infrared or as an email attachment.

When using a Bluetooth File Transfer Protocol client on a remote device, the HID configuration files are found in the “Other” folder of the phone’s File Transfer Protocol server.

Configuration file MIME type

The MIME type of configuration files when received Over The Air or via MMS is *application/vnd.sonyericsson.rc-conf.*

Modifying configuration files

When transferred to a computer, a HID configuration file can be modified using publicly available software. To open a TAR file, special archiver software is needed. Most zipping/unzipping utility programs can be used.

A user can modify the keypad configuration file or create a new one using a standard text editor, for example, Microsoft® WordPad or Microsoft® Notepad in the Microsoft® Windows® operating system. After creating a keypad configuration file, the user has to ensure that the file extension is ".kcf" before adding it to the TAR file.

A user can modify the image file or create a new one using tools such as Microsoft® Paint, Microsoft® Powerpoint®, or Microsoft® Photo Editor in the Microsoft® Windows® operating system.

After creating or modifying a TAR file, the user has to ensure that the file extension is ".hid" before transferring it to the mobile phone.

Mouse functionality

If the navigation key (joystick) and the two selection keys are not explicitly defined in the keypad configuration file, the mobile phone will by default assign mouse functionality to them according to the following:

- The navigation key is used to move the cursor. Pressing the navigation key corresponds to clicking the left mouse button.
- The left selection key corresponds to the left mouse button, including double-clicking. The right selection key corresponds to the right mouse button.
- Dragging and dropping is supported. A long press on the left selection key makes the "left mouse button pressed but not released". The selected object(s) can now be dragged by moving the navigation key in the desired direction. The dragged object is dropped by another press on the left selection key ("left mouse button released").

Examples of HID configuration files

This section contains some examples of HID configurations files.

Desktop

Functions

- Navigation as with the “up”, “down”, “right” and “left” arrow keys.
- Selection as with the “carriage return” key.
- “Escape” key.
- “Alt-TAB” enables toggling between the last two used applications on the task bar.
- “Shift-Alt-TAB” enables cyclic movement between all applications on the task bar.
- “Windows” key opens the Start menu in Windows.
- ”F10” key enables access to the leftmost menu of the application in focus.
- “Page up” and “Page down” keys on the volume +/- keys.
- Launch applications with “Ctrl+Alt+2” or “Ctrl+Alt+1” set in the Shortcut key field of a shortcut on the Windows desktop.

Image displayed on the phone’s screen

K700

S700

Keypad configuration (K700 example)

```
<SONY_ERICSSON_REMOTE_CONTROL_CONFIGURATION VERSION="1.0">
<KEYMAP>
    <KEY_1>
      <ACTION>
        <KEYBOARD MODIFIERS = "00" USAGEID = "29" />  <!-- 1= ESCAPE  -->
      </ACTION>
    </KEY_1>
    <KEY_2>
```

```
  <ACTION>
    <KEYBOARD MODIFIERS = "00" USAGEID = "52" />  <!-- 2= UP ARROW  -->
  </ACTION>
</KEY_2>
<KEY_3>
  <ACTION>
    <KEYBOARD MODIFIERS = "04" USAGEID = "2B" />  <!-- 3= ALT+TAB  -->
  </ACTION>
</KEY_3>
<KEY_4>
  <ACTION>
    <KEYBOARD MODIFIERS = "00" USAGEID = "50" />  <!-- 4= LEFT ARROW  -->
  </ACTION>
</KEY_4>
<KEY_5>
  <ACTION>
    <KEYBOARD MODIFIERS = "00" USAGEID = "28" />  <!-- 5= RETURN  -->
  </ACTION>
</KEY_5>
<KEY_6>
  <ACTION>
    <KEYBOARD MODIFIERS = "00" USAGEID = "4F" />  <!-- 6= RIGHT ARROW  -->
  </ACTION>
</KEY_6>
<KEY_7>
  <ACTION>
    <KEYBOARD MODIFIERS = "00" USAGEID = "43" />  <!-- 7= F10  -->
  </ACTION>
</KEY_7>
<KEY_8>
  <ACTION>
    <KEYBOARD MODIFIERS = "00" USAGEID = "51" />  <!-- 8= DOWN ARROW  -->
  </ACTION>
</KEY_8>
<KEY_9>
  <ACTION>
   <KEYBOARD MODIFIERS = "06" USAGEID = "2B" />  <!-- 9= ALT+SHIFT+TAB  -->
  </ACTION>
</KEY_9>
<KEY_0>
  <ACTION>
    <KEYBOARD MODIFIERS = "05" USAGEID = "1F" />  <!-- 0= CTRL+ALT+2   -->
  </ACTION>
</KEY_0>
<KEY_STAR>
  <ACTION>
    <KEYBOARD MODIFIERS = "05" USAGEID = "1E" />  <!-- *= CTRL+ALT+1  -->
  </ACTION>
</KEY_STAR>
<KEY_HASH>
  <ACTION>
    <KEYBOARD MODIFIERS = "08" USAGEID = "00" />  <!-- #= LEFT GUI  -->
  </ACTION>
</KEY_HASH>
<KEY_VOL_UP>
```

```
      <ACTION>
        <KEYBOARD MODIFIERS = "00" USAGEID = "4B" />  <!-- +=  PAGE UP -->
      </ACTION>
    </KEY_VOL_UP>
    <KEY_VOL_DOWN>
      <ACTION>
        <KEYBOARD MODIFIERS = "00" USAGEID = "4E" />  <!-- -=  PAGE DOWN  -->
      </ACTION>
    </KEY_VOL_DOWN>
</KEYMAP>
</SONY_ERICSSON_REMOTE_CONTROL_CONFIGURATION>
```

Presentation

Functions

- Start slide show mode.
- Leave slide show mode.
- Move to next slide (volume up key)
- Move to previous slide (volume down key).
- Black screen.
- White screen.

Image displayed on the phone's screen

K700

S700

Keypad configuration

```
<SONY_ERICSSON_REMOTE_CONTROL_CONFIGURATION VERSION="1.0">
  <KEYMAP>
    <KEY_1>
      <ACTION>
        <KEYBOARD MODIFIERS = "00" USAGEID = "4A" />  <!-- Go to first slide in
presentation -->
      </ACTION>
    </KEY_1>
    <KEY_2>
```

```
      <ACTION>
        <KEYBOARD MODIFIERS = "00" USAGEID = "3E" /> <!-- Start a slide show
-->
      </ACTION>
    </KEY_2>
    <KEY_3>
      <ACTION>
        <KEYBOARD MODIFIERS = "00" USAGEID = "4D" />  <!-- Go to last slide in
presentation -->
      </ACTION>
    </KEY_3>
    <KEY_4>
      <ACTION>
        <KEYBOARD MODIFIERS = "00" USAGEID = "05" />  <!-- Display a black
screen, or return to the slide show from a black screen -->
      </ACTION>
    </KEY_4>
    <KEY_5>
      <ACTION>
        <KEYBOARD MODIFIERS = "00" USAGEID = "29" />  <!-- End a slide show -->
      </ACTION>
    </KEY_5>
    <KEY_6>
      <ACTION>
        <KEYBOARD MODIFIERS = "00" USAGEID = "1A" />  <!-- Display a white
screen, or return to the slide show from a white screen -->
      </ACTION>
    </KEY_6>
    <KEY_VOL_UP>
      <ACTION>
        <KEYBOARD MODIFIERS = "00" USAGEID = "4E" />  <!-- Perform the next ani-
mation or advance to the next slide -->
      </ACTION>
    </KEY_VOL_UP>
    <KEY_VOL_DOWN>
      <ACTION>
        <KEYBOARD MODIFIERS = "00" USAGEID = "4B" />  <!-- Perform the previous
animation or return to the previous slide -->
      </ACTION>
    </KEY_VOL_DOWN>
  </KEYMAP>
</SONY_ERICSSON_REMOTE_CONTROL_CONFIGURATION>
```

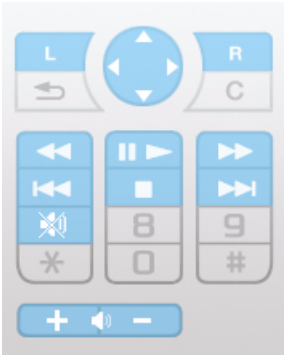
Media player

Functions

- “Play” starts playing the selected song/video.
- “Stop” stops playing the song/video.
- “Next” goes to next item and “Previous” goes to previous item.
- Rewind/fast forward (does not work in WMP).
- Increase or decrease volume using the volume +/- keys.

Image displayed on the phone's screen

K700



S700

Keypad configuration

```
<SONY_ERICSSON_REMOTE_CONTROL_CONFIGURATION VERSION = "1.0">
  <KEYMAP>
    <KEY_1>
      <ACTION>
        <KEYBOARD MODIFIERS = "01" USAGEID = "13"/> <!-- PLAY -->
      </ACTION>
    </KEY_1>
    <KEY_2>
      <ACTION>
        <KEYBOARD MODIFIERS = "01" USAGEID = "16"/> <!-- STOP -->
      </ACTION>
    </KEY_2>
    <KEY_3>
      <ACTION>
        <KEYBOARD MODIFIERS = "01" USAGEID = "05"/> <!-- PREV -->
      </ACTION>
    </KEY_3>
    <KEY_4>
      <ACTION>
        <KEYBOARD MODIFIERS = "01" USAGEID = "09"/> <!-- NEXT -->
      </ACTION>
    </KEY_4>
    <KEY_5>
      <ACTION>
        <KEYBOARD MODIFIERS = "03" USAGEID = "05"/> <!-- REWIND -->
      </ACTION>
    </KEY_5>
    <KEY_6>
      <ACTION>
        <KEYBOARD MODIFIERS = "03" USAGEID = "09"/> <!-- FAST FORWARD -->
      </ACTION>
    </KEY_6>
    <KEY_7>
      <ACTION>
```

```
        <KEYBOARD MODIFIERS = "00" USAGEID = "41"/> <!-- FAST FORWARD -->
      </ACTION>
    </KEY_7>
    <KEY_VOL_UP>
      <ACTION>
        <KEYBOARD MODIFIERS = "00" USAGEID = "43"/> <!-- VOL UP -->
      </ACTION>
    </KEY_VOL_UP>
    <KEY_VOL_DOWN>
      <ACTION>
        <KEYBOARD MODIFIERS = "00" USAGEID = "42"/> <!-- VOL DOWN -->
      </ACTION>
    </KEY_VOL_DOWN>
  </KEYMAP>
</SONY_ERICSSON_REMOTE_CONTROL_CONFIGURATION>
```

References

- The *Bluetooth Specification, Human Interface Device (HID) Profile v1.0* (https://www.bluetooth.org)
- *Universal Serial Bus, HID Usage Tables v1.11* (http://www.usb.org/developers/devclass_docs/Hut1_11.pdf)

Compliance statements

HID profile

The mobile phone complies with all the mandatory requirements applicable to the HID device role in the Bluetooth HID profile according to the *Bluetooth Specification, Human Interface Device (HID) Profile v1.0* (https://www.bluetooth.org). In addition to these, it also supports the following options:

- Pointing HID and Keyboard HID roles
- Establish HID connection
- Terminate HID connection
- HID to Host & Host to HID data transfer
- Data reports to Host and Device
- Set report and Get report commands
- Role switch accepting
- Sniff mode (initiating and accepting)

HID usage tables

The mobile phone supports the following Usage Pages according to the *Universal Serial Bus, HID Usage Tables v1.11* (http://www.usb.org/developers/devclass_docs/Hut1_11.pdf):

- Generic desktop page (0X01), for mouse functions (chapter 4 of the HID usage tables)
- Keyboard/Keypad (0X07) (chapter 8 of the HID usage tables).